SECTION 7 GUIDELINES - Snake River Basin Office
Bull Trout (Threatened)
(*Salvelinus confluentus*)

I. Background Information Regarding Bull Trout

Species Status

On June 10, 1998, the U.S. Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout as a threatened species (63 FR 31647) under the authority of the Endangered Species Act as amended (Act) of 1973. The effective date of the listing was July 10, 1998. The Jarbidge River population was listed as threatened on April 8, 1999 (64 FR 17110), and the Coastal-Puget Sound and St. Mary-Belly River populations were listed as threatened on November 1, 1999 (63 FR 58910). The result of these listings is that all bull trout in the coterminous United States are listed as threatened. The five populations discussed above are listed as distinct population segments (DPS) in that they meet the joint policy of the U.S. Fish and Wildlife Service and National Marine Fisheries Service regarding the recognition of distinct vertebrate populations (61 FR 4722). The U.S. Fish and Wildlife Service expects the draft Bull Trout Recovery Plan and a proposed critical habitat rule to be published in Fall 2002.

Species Description

Bull trout, a char in the salmonid family, were commonly known as Dolly Varden until recognized as a separate species by the American Fisheries Society in 1980. Char are distinguished from trout and salmon by the absence of teeth in the roof of the mouth, presence of light colored spots, small scales, and differences in the structure of their skeleton. Their spotting pattern is easily recognizable, showing pale yellow spots on the back, and pale yellow and orange or red spots on the sides. Bull trout fins are tinged with yellow or orange, while the pelvic, pectoral, and anal fins have white margins. Bull trout have no black or dark markings on the fins. They have an elongated body covered with cycloid scales, somewhat rounded and slightly compressed laterally. Unlike Dolly Varden, the head of a bull trout is more broad and flat on top, and hard to the touch. The bull trout was first described by Girard in 1856 from a specimen collected in the lower Columbia River.

Distribution within the Columbia River and Jarbidge River DPS

Historically, bull trout of the Columbia River DPS likely ranged through much of the Columbia River basin, with spawning and rearing occurring in the coldest creeks, often at higher elevations. Presently, bull trout of the Columbia River DPS are distributed in a more fragmented pattern throughout the Columbia River basin with fewer adult migratory fish and fewer or more compressed spawning reaches than historically. For more specific information on bull trout distribution within the Columbia River DPS, please refer to the draft Bull Trout Recovery Plan. To receive a copy of this document, please contact this office.

Although it lies within the Columbia River basin, the Service determined that bull trout in the Jarbidge River (Idaho and Nevada) are a separate DPS. There is one subpopulation in the Jarbidge River DPS. Most individuals occur in Nevada, although at least one bull trout was captured in Idaho on the lower East Fork and West Fork Jarbidge River in 1997 (F. Partridge, Idaho Department of Fish and Game (IDFG), pers. comm. 1998). Low numbers of migratory (fluvial) bull trout have been documented in the West Fork Jarbidge River from the 1970s through the mid-1980s (Johnson and Weller 1994). It is estimated that between 50 and 125 bull trout spawn throughout the Jarbidge River basin annually, although exact spawning sites and timing are uncertain (Johnson, pers. comm. 1998). Past and present activities within the basin are likely restricting bull trout migration in the Jarbidge River, thus reducing opportunities for bull trout reestablishment in areas where the fish are no longer found (USFWS 1998).

Life History

Bull trout exhibit resident and migratory life-history strategies through much of the current range (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in the tributary (or nearby) streams in which they spawn and rear. Migratory bull trout spawn in tributary streams where juvenile fish rear from one to four years before migrating to either a lake (adfluvial), a river (fluvial), or in certain coastal areas to salt water (anadromous) where they grow to maturity (Fraley and Shepard 1989; Goetz 1989). Growth of resident fish is generally slower than migratory fish; resident fish tend to be smaller at maturity and less fecund (Fraley and Shepard 1989; Goetz 1989). The size and age of maturity for bull trout is variable depending upon life-history strategy, but they typically reach sexual maturity in 4 to 7 years. Bull trout can live as long as 12 years.

Preferred bull trout spawning habitat consists of low gradient streams with loose, clean gravel (Fraley and Shepard 1989) and water temperatures 5E to 9E C (41 to 48E F) (Goetz 1989). Spawning occurs late summer to early fall in the upper reaches of clear streams in areas of flat gradient, uniform flow, and uniform gravel or small cobble. Bull trout typically spawn from August to November during periods of decreasing water temperatures. However, migratory bull trout frequently begin spawning migrations as early as April, and move upstream as far as 250 kilometers (km) (155 miles (mi)) to spawning grounds (Fraley and Shepard 1989). Temperatures during spawning generally range from 4 to 10E C (39 to 51E F), with redds often constructed in stream reaches fed by springs or near other sources of cold groundwater (Goetz 1989; Pratt 1992; Rieman and McIntyre 1996). Depending on water temperature, incubation is normally 100 to 145 days (Pratt 1992), and juveniles remain in the substrate after hatching. Time from egg deposition to emergence may surpass 200 days. Fry normally emerge from early April through May depending upon water temperatures and increasing stream flows (Pratt 1992; Ratliff and Howell 1992). Fry and juvenile fish are strongly associated with the stream bottom and are often found at or near it.

Resident and juvenile migratory bull trout prey on terrestrial and aquatic insects, macro-zooplankton, amphipods, mysids, crayfish, and small fish (Wyman 1975; Rieman and Lukens 1979 *in* Rieman and McIntyre 1993; Boag 1987; Goetz 1989; Donald and Alger 1993). Adult migratory bull trout are an apex predator that is primarily piscivorous, known to feed on various trout (*Salmo* spp.) and salmon (*Onchorynchus* spp.), whitefish (*Prosopium* spp.), yellow perch (*Perca flavescens*), and sculpin (*Cottus* spp.) (Fraley and Shepard 1989; Donald and Alger 1993). Growth varies depending upon life-history strategy. Resident adults range from 150 to 300 millimeters (mm) (6 to 12 inches (in.)) total length, and migratory adults commonly reach 600 mm (24 in) or more (Pratt 1985; Goetz 1989).

Older individuals are found in deeper and faster water compared to juveniles. Adults are often found in pools sheltered by large, organic debris or "clean" cobble substrate (McPahil and Murray 1979). Migratory bull trout may use a wide range of habitats ranging from first-to-sixth order streams and varying by season and life stage. In intermountain areas, lower-elevation lakes and rivers constitute important habitats for maturing and overwintering fluvial and adfluvial bull trout. Resident populations are generally found in small headwater streams where they spend their entire lives. Stream resident bull trout occupy small, high-elevation streams.

Where suitable migratory corridors exist, extensive migrations are characteristic of this species. Retention and recovery of migratory life history forms and maintenance or re-establishment of stream migration corridors is considered crucial to the persistence of bull trout throughout their geographic range. Migratory bull trout facilitate the interchange of genetic material between local subpopulations and are necessary for recolonizing habitat where subpopulations are or become extirpated by natural or human-caused events.

Habitat Needs

Bull trout have habitat requirements that are more specific than those for many other salmonids (Rieman and McIntyre 1993). Five elements relate to suitable bull trout habitat: 1) substrate composition that includes free interstitial spaces, 2) complex cover including large woody debris, undercut banks, boulders, shade, pools or deep water, 3) cold water temperatures, 4) channel and hydraulic stability, and 5) connectivity among habitats through migratory corridors. Stream temperatures and substrate types are especially important to bull trout, with water temperature representing a critical habitat characteristic for bull trout. Temperatures above 15E C (59E F) are thought to limit bull trout distribution (Rieman and McIntyre 1993). Spawning bull trout require hiding cover such as logs and undercut banks. Strict habitat requirements make spawning and incubation habitat for bull trout limited and valuable (Fraley and Shepard 1989). Strong populations require high stream channel complexity, and are likely to be found in areas with low road densities, on forested lands, and in mid-size streams at relatively high elevations (> 5000 feet) (Quigley and Arbeldide 1997). However, because bull trout exhibit a patchy distribution, even in undisturbed habitats (Rieman and McIntyre 1993), fish are not likely to simultaneously occupy all available habitats (Rieman et al. 1997).

Threats

Bull trout are vulnerable to many of the same threats that have reduced salmon populations in the

Columbia River Basin. They are more sensitive to increased water temperatures, poor water quality, and low flow conditions than many other salmonids. Past and continuing land management activities such as timber harvest, livestock grazing, road construction, and mining have degraded stream habitat, especially those along larger river systems and stream areas located in valley bottoms, to the point where bull trout can no longer survive or successfully reproduce. Cumulative impacts of these activities are increased stream temperatures, more fine sediment in spawning gravels, loss of stream channel stability, and the creation of migration barriers. Road construction and maintenance account for a majority of man-induced sediment loads to streams in forested areas (Shepard et al. 1984; Cederholm and Reid 1987; Furniss et al. 1991). Sedimentation affects streams by reducing pool depth, altering substrate composition, reducing interstitial space, and causing braiding of channels (Rieman and McIntyre 1993), which reduce carrying capacity. Sedimentation negatively affects bull trout embryo survival and juvenile bull trout rearing densities (Shepard et al. 1984; Pratt 1992).

Large dams built for flood control and power production have eliminated riverine habitat and restricted bull trout movement. Culverts installed at road crossings may also act as barriers to bull trout movement. Additionally, irrigation withdrawls including diversions can dewater spawning and rearing streams, impede fish passage and migration, and cause entrainment. Discharging pollutants such as nutrients, agricultural chemicals, animal waste, and sediment into spawning and rearing waters is also detrimental. The loss and degradation of habitat has isolated many populations, increasing the risk of extinction due to demographic, genetic, and environmental stochasticity, and other natural catastrophic events. In many watersheds, remaining bull trout are small, resident fish isolated in headwater streams.

Historically, both intentional reductions and liberal harvest regulations posed a threat to some bull trout populations. Bull trout can no longer be legally harvested in Idaho, but misidentification of bull trout as brook trout or lake trout is resulting in some fish being killed accidentally. Illegal poaching of spawning adults is a problem in some areas.

Hybridization, competition, and predation from non-native species has also been detrimental to bull trout. Brook trout readily spawn with bull trout creating a hybrid that is often sterile. Lake trout have out-competed and replaced adfluvial populations of bull trout in some lakes. Overall, interspecific interactions, including predation, with non-native species may exacerbate stresses on bull trout from habitat degradation, fragmentation, isolation, and species interactions (Rieman and McIntyre 1993).

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II. Guidelines for Analyzing Effects of Actions on Bull Trout and Their Habitat

A biological assessment is required if bull trout or bull trout critical habitat may be present in the action area of major construction activities proposed or funded by Federal agencies. One of the purposes of the biological assessment is to help make the determination of whether the proposed action is *likely to adversely affect* bull trout or critical habitat. To make such a determination, a biological assessment must describe and analyze the direct, indirect, and cumulative effects of each federal action, and determine the degree of effects to bull trout. When critical habitat is proposed, the biological assessment must also address effects on proposed critical habitat and determine the degree of effect on proposed critical habitat. Analysis of effects must also assess the indirect effects resulting from interdependent and interrelated federal and non-federal actions.

In 1998, the Service developed a document titled "A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale". It was designed to facilitate and standardize determinations of effect for Endangered Species Act (ESA) consultations focusing on bull trout. Bull trout, especially with their migratory habits, use or depend on entire watersheds to complete their life cycle. Bull trout biology and cumulative effects must be analyzed in a watershed context in order to account for baseline conditions, to predict impacts from future actions, and to assess the complete life cycle of bull trout. This framework is best applied to individual or grouped actions at the 5th field Hydrologic Unit Code (HUC) watershed scale. This framework document contains definitions of ESA effects and examples of effects determinations, a recommended reading list to help in understanding the importance of an indicator on bull trout, a matrix of diagnostics/pathways of effects and indicators of those effects, a checklist for documenting the environmental baseline and effects of the proposed action(s) on the relevant indicators, and a dichotomous key for making determinations of effect. We have included the matrix, the check list, and the dichotomous key to assist you in making your effects determinations. Please contact our office if you have any questions about how to implement these materials, or if you would like a copy of the full document

TABLE 1. MATRIX of DIAGNOSTICS / PATHWAYS AND INDICATORS

(Remember, the values of criteria presented here are NOT absolute, they may be adjusted for local watersheds given supportive documentation. See p. 7)

DIAGNOSTIC OR PATHWAY	INDICATORS	FUNCTIONING ADEQUATELY	FUNCTIONING AT RISK	FUNCTIONING AT UNACCEPTABLE RISK
SPECIES:				
Subpopulation Characteristics within subpopulation watersheds	Subpopulation Size	Mean total subpopulation size or local habitat capacity more than several thousand individuals. All life stages evenly represented in the subpopulation.[1]	Adults in subpopulation are less than 500 but >50.[1]	Adults in subpopulation has less than 50. [1]
	Growth and Survival	Subpopulation has the resilience to recover from short term disturbances (e.g. catastrophic events, etc) or subpopulation declines within one to two generations (5 to 10 years). Subpopulation is fluctuating around an equilibrium or is growing.[1]	When disturbed, the subpopulation will not recover to predisturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. [1]	There is a clear declining trend in subpopulation size. Under current management, the subpopulation condition will not improve within two generations (5 to 10 years). [1]
	Life History Diversity and Isolation	The migratory form is present and the subpopulation exists in close proximity to other spawning and rearing groups. Migratory corridors and rearing habitat (lake or larger river) are in good to excellent condition for the species. Neighboring subpopulations are large with high likelihood of producing surplus individuals or straying adults that will mix with other subpopulation groups. [1]	The migratory form is present but the subpopulation is not close to other subpopulations or habitat disruption has produced a strong correlation among subpopulations that do exist in proximity to each other. [1]	The migratory form is absent and the subpopulation is isolated to the local stream or a small watershed not likely to support more than 2,000 fish.[1]
	Subpopulation Trend	The subpopulation is characterized as increasing or stable. At least 10+ years of data support this estimate.[2]	The subpopulation is characterized as stable or fluctuating in a downward trend. At least 10+ years of data support this characterization.[2] If less data is available and a trend can not be confirmed, a subpopulation will be considered at risk until enough data is available to accurately determine its trend.	The subpopulation is characterized as in rapid decline or is maintaining at alarmingly low numbers. This is supported by a minimum of 5+ years of data.

	Persistence and Genetic Integrity	Connectivity is high among multiple (5 or more) subpopulations with at least several thousand fish each. Each of the relevant subpopulations has a low risk of extinction. [1] The probability of hybridization or displacement by competitive species is low to nonexistent.	Connectivity among multiple subpopulations does occur, but habitats are more fragmented. Only one or two of the subpopulations represent most of the fish production. [1] The probability of hybridization or displacement by competitive species is imminent, although no documented cases have occurred.	Little or no connectivity remains for refounding subpopulations in low numbers, in decline, or nearing extinction. Only a single subpopulation or several local populations that are very small or that otherwise are at high risk remain.[1] Competitive species readily displace bull trout. The probability of hybridization is high and documented cases have occurred.
HABITAT:				
Water Quality:	Temperature	7 day average maximum temperature in a reach during the following life history stages: [1, 3] incubation 2 - 5EC rearing 4 - 12 EC spawning 4 - 9EC also temperatures do not exceed 15EC in areas used by adults during the local spawning migration	7 day average maximum temperature in a reach during the following life history stages:[1, 3] incubation <2EC or 6EC rearing <4EC or 13 - 15 EC spawning <4 EC or 10EC also temperatures in areas used by adults during the local spawning migration sometimes exceeds 15EC	7 day average maximum temperature in a reach during the following life history stages:[1, 3] incubation <1EC or >6EC rearing >15 EC spawning <4 EC or > 10EC also temperatures in areas used by adults during the local spawning migration regularly exceed 15EC
	Sediment (in areas of spawning and incubation)	Similar to chinook salmon [1]: for example (e.g.): < 12% fines (<0.85mm) in gravel[4]; e.g. $\leq$20% surface fines of $\leq$6mm[5, 6]	Similar to chinook salmon [1]: e.g. 12-17% fines (<0.85mm) in gravel[4]; e.g. 12-20% surface fines [7]	Similar to chinook salmon [1]: e.g. >17% fines (<0.85mm) in gravel[4]; e.g. >20% fines at surface or depth in spawning habitat[7]
	Chemical Contamination/ Nutrients	low levels of chemical contamination from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches[8]	moderate levels of chemical contamination from agricultural, industrial and other sources, some excess nutrients, one CWA 303d designated reach[8]	high levels of chemical contamination from agricultural, industrial and other sources, high levels of excess nutrients, more than one CWA 303d designated reach[8]
Habitat Access:	Physical Barriers (address subsurface flows impeding fish passage under the pathway “flow/hydrology”)	any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows
Habitat Elements:	Substrate Embeddedness in rearing areas (spawning and incubation areas were addressed under the indicator “sediment”)	reach embeddedness <20%[9, 10]	reach embeddedness 20-30% [9,10]	reach embeddedness >30%[4,10]

	Large Woody Debris	current values are being maintained at greater than 80 pieces/mile that are >24"diameter and >50 ft length on the Coast [9], or >20 pieces/ mile >12"diameter >35 ft length on the East-side[11] ; also adequate sources of woody debris are available for both long and short-term recruitment	current levels are being maintained at minimum levels desired for "functioning adequately", but potential sources for long term woody debris recruitment are lacking to maintain these minimum values	current levels are not at those desired values for "functioning adequately", and potential sources of woody debris for short and/or long term recruitment are lacking
	Pool Frequency and Quality	pool frequency in a reach closely approximates [5]: Wetted width (ft) — #pools/mile 0-5 — 39 5-10 — 60 10-15 — 48 15-20 — 39 20-30 — 23 30-35 — 18 35-40 — 10 40-65 — 9 65-100 — 4 also, pools have good cover and cool water[4], and only minor reduction of pool volume by fine sediment	pool frequency is similar to values in "functioning adequately", but pools have inadequate cover/temperature[4], and/or there has been a moderate reduction of pool volume by fine sediment	pool frequency is considerably lower than values desired for "functioning adequately"; also cover/temperature is inadequate[4], and there has been a major reduction of pool volume by fine sediment
	Large Pools (in adult holding, juvenile rearing, and overwintering reaches where streams are >3m in wetted width at baseflow)	each reach has many large pools >1 meter deep[4]	reaches have few large pools (>1 meter) present[4]	reaches have no deep pools (>1 meter)[4]
	Off-channel Habitat (see reference 18 for identification of these characteristics)	watershed has many ponds, oxbows, backwaters, and other off-channel areas with cover; and side-channels are low energy areas[4]	watershed has some ponds, oxbows, backwaters, and other off-channel areas with cover; but side-channels are generally high energy areas[4]	watershed has few or no ponds, oxbows, backwaters, or other off-channel areas[4]
	Refugia (see Checklist footnotes for definition of this indicator)	habitats capable of supporting strong and significant populations are protected and are well distributed and connected for all life stages and forms of the species [12, 13]	habitats capable of supporting strong and significant populations are insufficient in size, number and connectivity to maintain all life stages and forms of the species[12, 13]	adequate habitat refugia do not exist[12]
Channel Condition & Dynamics:	Wetted Width/ Maximum Depth Ratio in scour pools in a reach	≤10[7, 5]	11 - 20[5]	>20[5]
	Streambank Condition	>80% of any stream reach has ≥90% stability[5]	50 - 80% of any stream reach has ≥90% stability[5]	<50% of any stream reach has ≥90% stability[5]

	Floodplain Connectivity	off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation and succession	reduced linkage of wetland, floodplains and riparian areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function, riparian vegetation/succession	severe reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent drastically reduced and riparian vegetation/succession altered significantly
Flow/Hydrology:	Change in Peak/ Base Flows	watershed hydrograph indicates peak flow, base flow and flow timing characteristics comparable to an undisturbed watershed of similar size, geology and geography	some evidence of altered peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography	pronounced changes in peak flow, baseflow and/or flow timing relative to an undisturbed watershed of similar size, geology and geography
	Increase in Drainage Network	zero or minimum increases in active channel length correlated with human caused disturbance	low to moderate increase in active channel length correlated with human caused disturbance	greater than moderate increase in active channel length correlated with human caused disturbance
Watershed Conditions:	Road Density & Location	<1mi/mi² [13]	1 - 2.4 mi/mi² [13]	>2.4 mi/mi² [13]
	Disturbance History	<15% ECA of entire watershed with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area there is an additional criteria of $15% LSOG in watersheds[14]	<15% ECA of entire watershed but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; and for NWFP area there is an additional criteria of $15% LSOG in watersheds[14]	>15% ECA of entire watershed and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian area; does not meet NWFP standard for LSOG
	Riparian Conservation Areas (RHCA - PACFISH and INFISH) (Riparian Reserves - Northwest Forest Plan)	the riparian conservation areas provide adequate shade, large woody debris recruitment, and habitat protection and connectivity in subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and adequately buffer impacts on rangelands: percent similarity of riparian vegetation to the potential natural community/ composition >50%[15]	moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian conservation areas, or incomplete protection of habitats and refugia for sensitive aquatic species (. 70-80% intact), and adequately buffer impacts on rangelands : percent similarity of riparian vegetation to the potential natural community/composition 25-50% or better[15]	riparian conservation areas are fragmented, poorly connected, or provides inadequate protection of habitats for sensitive aquatic species (<70% intact, refugia does not occur), and adequately buffer impacts on rangelands : percent similarity of riparian vegetation to the potential natural community/composition <25%[15]
	Disturbance Regime	Environmental disturbance is short lived; predictable hydrograph, high quality habitat and watershed complexity providing refuge and rearing space for all life stages or multiple life-history forms. [1]	Scour events, debris torrents, or catastrophic fire are localized events that occur in several minor parts of the watershed. Resiliency of habitat to recover from environmental disturbances is moderate.	Frequent flood or drought producing highly variable and unpredictable flows, scour events, debris torrents, or high probability of catastrophic fire exists throughout a major part of the watershed. The channel is simplified, providing little hydraulic complexity in the form of pools or side channels. [1]

SPECIES AND HABITAT:			
Integration:	Habitat quality and connectivity among subpopulations is high. The migratory form is present. Disturbance has not altered channel equilibrium. Fine sediments and other habitat characteristics influencing survival or growth are consistent with pristine habitat. The subpopulation has the resilience to recover from short-term disturbance within one to two generations (5 to 10 years). The subpopulation is fluctuating around an equilibrium or is growing.[1]	Fine sediments, stream temperatures, or the availability of suitable habitats have been altered and will not recover to predisturbance conditions within one generation (5 years). Survival or growth rates have been reduced from those in the best habitats. The subpopulation is reduced in size, but the reduction does not represent a long-term trend. The subpopulation is stable or fluctuating in a downward trend. Connectivity among subpopulations occurs but habitats are more fragmented.[1]	Cumulative disruption of habitat has resulted in a clear declining trend in the subpopulation size. Under current management, habitat conditions will not improve within two generations (5 to 10 years). Little or no connectivity remains among subpopulations. The subpopulation survival and recruitment responds sharply to normal environmental events. [1]

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[14] Northwest Forest Plan, 1994. Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl. USDA Forest Service and USDI Bureau of Land Management.
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TABLE 2. CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS

DIAGNOSTICS/ PATHWAYS: INDICATORS	POPULATION AND ENVIRONMENTAL BASELINE (list values or criterion and supporting documentation)			EFFECTS OF THE ACTION(S)			
	Functioning Adequately	Functioning At Risk	Functioning at Unacceptable Risk	Restore[1]	Maintain[2]	Degrade[3]	Compliance with ACS
Subpopulation Characteristics: Subpopulation Size							
Growth and Survival							
Life History Diversity and Isolation							
Subpopulation Trend							
Persistence and Genetic Integrity							
Water Quality: Temperature							
Sediment							
Chem. Contam./Nutrients							
Habitat Access: Physical Barriers							
Habitat Elements: Substrate Embeddedness							
Large Woody Debris							
Pool Frequency and Quality							
Large Pools							
Off-channel Habitat							
Refugia[4]							
Channel Cond. & Dynamics: Wetted Width/Max.Depth Ratio							
Streambank Condition							
Floodplain Connectivity							
Flow/Hydrology: Change in Peak/Base Flows							
Drainage Network Increase							
Watershed Conditions: Road Density & Location							
Disturbance History							
Riparian Conservation Areas							
Disturbance Regime							
Integration							

Watershed Name: ______________________ Location: ______________________

1 For the purposes of this checklist, "restore" means to change the function of an "functioning at risk" indicator to "functioning adequately", or to change the function of a "functioning at unacceptable risk" indicator to "functioning at risk" or "functioning adequately" (i.e., it does not apply to "functioning adequately" indicators). Restoration from a worse to a better condition does not negate the need to consult/confer if take will occur.

2 For the purposes of this checklist, "maintain" means that the function of an indicator does not change (i.e., it applies to all indicators

regardless of functional level).

3 For the purposes of this checklist, "degrade" means to change the function of an indicator for the worse (i.e., it applies to all indicators regardless of functional level). In some cases, a "functioning at unacceptable risk" indicator may be further worsened, and this should be noted.

4 Refugia = watersheds or large areas with minimal human disturbance having relatively high quality water and fish habitat, or having the potential of providing high quality water and fish habitat with the implementation of restoration efforts. These high quality water and fish habitats are well distributed and connected within the watershed or large area to provide for both biodiversity and stable populations.

(adapted from discussions on "Stronghold Watersheds and Unroaded Areas" in Lee, D.C., J.R. Sedell, B.E. Rieman, R.F. Thurow, J.E. Williams and others. 1997. Chapter 4: Broadscale Assessment of Aquatic Species and Habitats. *In* T.M. Quigley and S. J. Arbelbide eds "An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins Volume III". U.S. Department of Agriculture, Forest Service, and U.S. Department of Interior, Bureau of Land Management, Gen Tech Rep PNW-GTR-405).

TABLE 3. DICHOTOMOUS KEY FOR MAKING ESA DETERMINATION OF EFFECTS

1. Are there any proposed/listed fish species and/or proposed/designated critical habitat in the watershed or downstream from the watershed?

   NO . . . . **No effect**
   YES . . . . Go to 2

2. Will the proposed action(s) have any effect whatsoever[1] on the species; designated or proposed critical habitat; seasonally or permanently occupied habitat; or unoccupied habitat necessary for the species' survival[4]

   NO . . . . **No effect**
   YES...**(May Affect)** Go to 3

3. Does the proposed action(s) have potential to: result in "take"[2] of any proposed/listed fish species?

   B. NO . . . . Go to 4
   A. YES . . . . **Likely to adversely affect**

4. Does the proposed action(s) have the potential to or cause an adverse effect to any proposed/listed fish species habitat, such as: adverse effects to critical habitat constituent elements or segments; impairing the suitability of seasonally or permanently occupied habitat[3]; or impairing or degrading unoccupied habitat necessary for the survival or recovery of the species locally?

   A. NO . . . . **Not likely to adversely affect**

   B. Yes . . . . **Likely to adversely affect**

1 "Any effect whatsoever" includes small effects, effects that are unlikely to occur, and beneficial effects. I.e. A "no effect" determination is only appropriate if the proposed action will literally have no effect whatsoever on the species and/or critical habitat, not a small effect, an effect that is unlikely to occur, or a beneficial effect.

2 "Take" - The ESA (Section 3) defines take as "to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect or attempt to engage in any such conduct". The USFWS (USFWS, 1994) further defines "harm" as "significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering", and "harass" as "actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering".

3 Action(s) with potential to hinder attainment of relevant "**functioning appropriately indicators**" (from table 2) may result in an effect determination due to negative effects on habitat. This may indicate harm or harassment take of the species or adverse effects to habitat necessary for survival or recovery of the species locally (i.e. potential for adverse affect w/o take, or adversely affecting critical habitat).

4. Survival - The species persistence, as listed or as a recovery unit, beyond the conditions leading to its endangerment, with sufficient resilience to allow recovery from endangerment. This condition is characterized by a species with a sufficiently large population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter (USDI and USDC 1998).

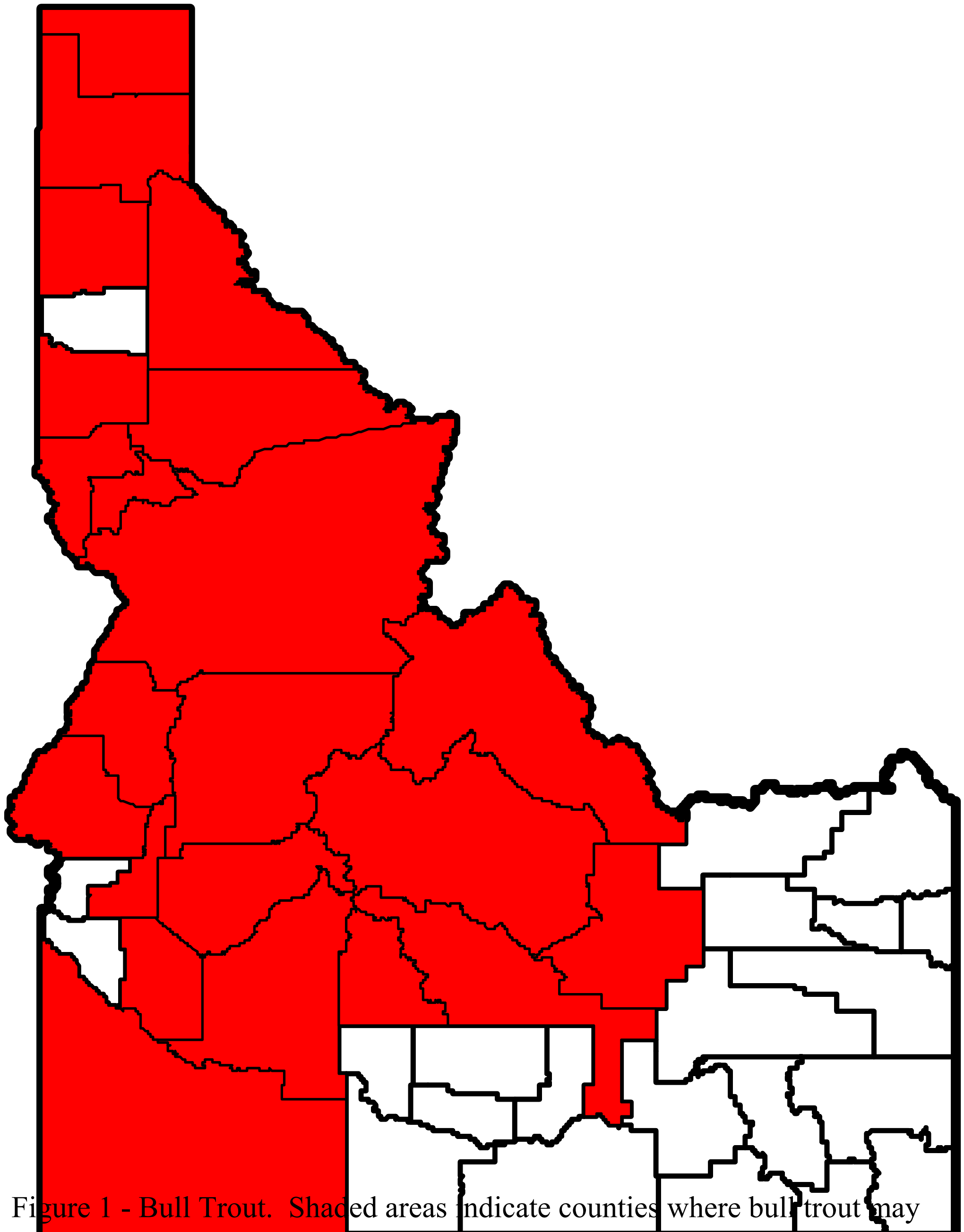

Figure 1 - Bull Trout. Shaded areas indicate counties where bull trout may occur.